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APPLICATION FOR PATENT

ON

QUICK RELEASE SUB-BASE ROUTER

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QUICK RELEASE SUB-BASE ROUTER

CROSS-REFERENCE TO RELATED DOCUMENTS

[0001] The present application claims the benefit under 35 U.S.C. § 119(e) of U.S. Provisional Application Serial No. 60/418,510, filed October 15, 2002, and claims the benefit under 35 U.S.C. § 119(e) of U.S. Provisional Application Serial No. 60/467,169, filed May 1, 2003. Said U.S. Provisional Application Serial No. 60/418,510 and said U.S. Provisional Application Serial No. 60/467,169 are herein incorporated by reference in their entirety.

[0002] The present application herein incorporates U.S. Application Serial No. 10/384,510, filed March 7, 2003, and U.S. Application Serial No. 10/458,167, filed June 10, 2003 by reference in their entirety.

FIELD OF THE INVENTION

[0003] The present invention relates generally to routers, and particularly to a quick release sub-base router.

BACKGROUND OF THE INVENTION

[0004] The use of routers and router sub-bases in woodworking applications and the like is well known. A router sub-base provides a planar surface for supporting the router on a work piece. The router sub-base is typically attached to a planar router base and has an aperture (bit opening) aligned with a collet of a motor unit to allow a router bit to be projected therethrough to remove material from the work piece. Various methods have been used to attach a router sub-base to a router base. For example, FIG. 1 shows an exemplary router 100 with a conventional sub-base 102. The sub-base 102 has in its center a bit opening 104. To attach (or mount) the sub-base 102 to a planar base of the router 100, the sub-base 102 has a plurality of screw holes 106. When the screw holes 106 are aligned with the corresponding holes 108 positioned in the planar base of the router 100, the sub-base 102 may be attached to the planar router base by driving sub-base screws 110 into the holes 106 and 108.

[0005] Most router sub-bases have only one bit opening. A router is normally designed, however, for use with router bits of different size. Thus, to accommodate a variety of different bits, several router sub-bases are often required. Because a router sub-base is conventionally attached to the planar router base through sub-base screws, mounting and/or changing the router sub-base may be inconvenient and time-consuming. For example, in order to attach the sub-base 102 to the base of the router 100 shown in FIG. 1, a user has to drive all sub-base screws 110 into the holes 106 and 108. Alternatively, when an attached sub-base 102 needs be changed, a user has to first unscrew all sub-base screws 110, align all screw holes in a replacement sub-base with the corresponding holes 108 in the router base, and then drive all sub-base screws 110 into the holes of the replacement sub-base and the corresponding holes 108. Furthermore, sub-base screws may get lost during the process of change sub-bases.

[0006] Thus, it would be desirable to provide a quick release sub-base to enable convenient and timesaving sub-base changing.

SUMMARY OF THE INVENTION

[0007] Accordingly, the present invention is directed to a quick release sub-base router. In a first exemplary aspect of the present invention, a quick release sub-base includes a flat plate member having a first side and a second side. The flat plate member further includs a bit opening extending therethrough for allowing a router bit to be projected therethrough to remove material from a work piece. In addition, the flat plate member includes at least one keyhole extending therethrough. The keyhole is defined by a generally keyhole-shaped outer edge and includes a larger circular first section and a smaller second section. The first section and second section are diametrically large enough for receiving a head portion of at least one screw securely inserted onto a planar router base.

[0008] In an additional exemplary aspect of the present invention, a router includes a planar router base with at least one screw being securely inserted therein, and a quick release sub-base attached to the planar router base. The quick release sub-base includes a flat plate member having a first side and a second side and including a bit opening extending therethrough for allowing a router bit to be projected therethrough to remove material from a work piece. The flat plate member includes at least one keyhole extending therethrough. The keyhole is defined by a generally keyhole-shaped outer edge and has a larger circular first section and a smaller second section. The first section and second section are diametrically large enough for receiving a head portion of the screw.

[0009] In another exemplary aspect of the present invention, a router table apparatus includes a router table having a work surface supported on legs, and a quick-release sub-base inserted into the working surface so as to be flush therewith. The quick-release sub-base includes a flat plate member having a first side and a second side and including a bit opening extending therethrough for allowing a router bit to be projected therethrough to remove material from a work piece. The flat plate member includes at least one keyhole extending therethrough. The keyhole is defined by a generally keyhole-shaped outer edge and has a larger circular first section and a smaller second section. The first section and second section are diametrically large enough for receiving a head portion of at least one screw securely inserted onto a planar router base.

[0010] In a further exemplary aspect of the present invention, a method for mounting a quick release sub-base to a planar router base includes the following steps: (1) aligning larger circular sections of keyholes located in a sub-base with corresponding screws securely inserted onto a router base; (2) putting the sub-base and the router base together so that a head portion of each of the screws are received inside the larger sections of the keyholes; and (3) rotating the router base or the sub-base relative to each other so that a rabbet flange surface located inside the keyholes engages the head portion of the screw to lock the sub-base to the router base.

[0011] In a still further exemplary aspect of the present invention, a method for removing an attached quick release sub-base from a router base includes the following steps: (1) raising an extensible pin, which extends from a router base into a recess located onto a sub-base, from the recess so that the sub-base and the router base can be moved relative to each other; (2) rotating the router base or the sub-base relative to each other so that a head portion of at least one screw securely inserted onto the router base is positioned inside a larger circular section of at least one keyhole located inside the sub-base; and (3) separating the sub-base from the router base.

[0012] It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory only and are not restrictive of the invention as claimed. The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate an embodiment of the invention and together with the general description, serve to explain the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The numerous advantages of the present invention may be better understood by those skilled in the art by reference to the accompanying figures in which:

FIG. 1 shows an exemplary router with a conventional sub-base;

FIG. 2 is an isometric view illustrating an exemplary router having a quick release sub-base attached to a router base in accordance with an exemplary embodiment of the present invention;

FIG. 3 is a partial isometric view of the router illustrated in FIG. 2, wherein the quick release sub-base is shown in more detail;

FIG. 4 is an isometric view of the router illustrated in FIG. 3, wherein the sub-base is removed from the router base for further illustration of the router sub-base;

FIG. 5 is a partial cross-sectional view of the quick release sub-base and the router base illustrated in FIG. 2; and

FIG. 6 is an isometric view of a router table, wherein a quick release sub-base may be attached to the router table in accordance with an exemplary embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0014] Reference will now be made in detail to the presently preferred embodiments of the invention, examples of which are illustrated in the accompanying drawings.

[0015] Referring first to FIG. 2, an isometric view illustrating an exemplary router 200 having a quick release sub-base 202 in accordance with an exemplary embodiment of the present invention is shown. The router 200 includes a motor housing 204, router handles 206, a collet 208, and a planar router base 210 to which the quick release sub-base 202 is attached. The sub-base 202 includes a flat plate member 212 having a first side 214 contacting the planar router base 210, a second side 216, and an aperture (bit opening) 218 extending therethrough. The bit opening 218 is aligned with the collet 208 to allow a router bit (not shown) to be projected therethrough to remove material from a work piece. The sub-base 202 provides a planar surface for supporting the router 200 on a work piece.

[0016] Referring now to FIGS. 3-5, the quick release sub-base 202 and the base 210 of the router 200 illustrated in FIG. 2 are shown in more detail. As shown, the sub-base 202 includes a plurality of keyholes 220 in the flat plate member 212. Each keyhole 220 is defined by a generally keyhole-shaped outer edge 222 and includes a first larger circular section 224 and a second smaller section 226 (i.e., the rest of the keyhole 220). In a preferred embodiment, the keyholes 222 are curved. Moreover, the keyholes 220 are preferably evenly distributed and have the same radius from the center of the flat plate member 212.

[0017] Inside the second smaller section 226 of the keyhole 220, a rabbet flange 228 extends inwardly from the outer edge 222. The rabbet flange 228 includes a first rabbet flange surface adjacent or being part of the first side 214 of the flat plate member 212, a rabbet flange wall generally perpendicular to the first side 214 and the second side 216 of the flat plate member 212, and a second rabbet flange surface adjacent the second side 216. In one embodiment, the second rabbet flange surface is generally parallel to the first side 214 and the second side 216 of the flat plate member 212. Preferably, the second rabbet flange surface is a little tiled so that a distance between the second rabbet flange surface and the second side 216 decreases away from the first larger circular section 224 of the keyhole 220.

[0018] The second smaller section 226 of the keyhole 220 includes a screw head subsection formed by the second side 216 of the flat plate member 212, the outer edge 222, and the second rabbet flange surface. The rest of the second smaller section 226 is a screw shaft subsection. In other words, the screw head subsection of the second section 226 is positioned between the second side 216 of the flat plate member 212 and a plane including the second rabbet flange surface, and the screw shaft subsection of the second section 226 is positioned between the first side 214 of the flat plate member 212 and the plane including the second rabbet flange surface.

[0019] The planar router base 210 includes a plurality of screw recesses 230, each corresponding with one of the plurality of the keyholes 220. A screw 232 is securely inserted onto each screw recess 230. The screw 232 has a head portion diametrically larger than its shaft portion. The head portion of the screw 232 is diametrically smaller than the first section 224 of the keyhole 220. In addition, the head portion of the screw 232 is the same as, or slightly smaller than, the screw head subsection of the second section 226 of the keyhole 220. This way, the head portion of the screw 232 can be received into and moved inside the key hole 220. Moreover, the shaft portion of the screw 232 is diametrically the same as, or slightly smaller than, the screw shaft subsection of the second portion 226 of the keyhole 220 so that the shaft portion of the screw 232 can be received into and moved inside the key hole 220.

[0020] To mount the sub-base 202 to the router base 210, the first sections 224 of the keyholes 220 of the sub-base 202 are first aligned with the corresponding screws 232 securely inserted onto the recesses 230 of the router base 210. Then, the sub-base 202 and the base 210 are put together so that the head portion and part of the shaft portion of each screw 232 are received inside the corresponding first section 224 of the keyhole 220. Next, the base 210 or the sub-base 202 is rotated relative to each other so that the second rabbet flange surface and/or the outer edge 222 engages the head portion of the screw 232 to lock the sub-base 202 to the base 210 (see, e.g., FIGS. 3 and 5). As described above, the second rabbet flange surface is preferably a little tiled so that a distance between the second rabbet flange surface and the second side 216 decreases away from the first larger circular section 224 of the keyhole 220. This feature may help lock the sub-base 202 to the base 210 and unlock the sub-base 202 from the base 210. Moreover, the rabbet flange wall may also engage the shaft portion of the screw 232 to help lock the sub-base 202 to the base 210. In a preferred embodiment, the height of the head portion of the screw 232 is the same as, or slightly shorter than the shortest distance between the second rabbet flange surface and the second side 216 of the flat plate member 212. This way, it can be ensured that the second side 216 of the flat plate member 212 has a flat surface so that the sub-base 202 may provide a planar surface for supporting the router 200 on a work piece.

[0021] When a user need change the attached sub-base 202 such as that shown in FIG. 3, the user may rotate either the base 210 or the sub-base 202 so that the screw 232 is positioned inside the first section 224 of the keyhole 220. Next, the sub-base 202 may be removed from the base 210 by simply pulling the sub-base 202 away from the base 210. A replacement sub-base shaped like the sub-base 202 may then be mounted to the base 210 as previously described.

[0022] Thus, the sub-base of the present invention may have the following advantages. First, attaching the sub-base to a router base may become convenient and timesaving because there is no need to drive screws into the router base. Similarly, removing the sub-base form a router base may also become convenient and timesaving because there is no need to take screws out of the router base. Moreover, since screws are always securely inserted onto the router base, a user may not need to worry that screws might get lost.

[0023] In a preferred embodiment, the base 210 also includes a securing device located therein to prevent the sub-base 202 from moving relative to the base 210. In a preferred embodiment, the securing device is an extensible pin 234, which may be in a depressed position and a raised position. In the depressed position, the pin 234 extends beyond the base 210 (see, e.g., FIGS. 4-5). In the raised position, the pin 234 does not extend beyond the base 210. The sub-base 202 also includes a pin hole 236 for receiving the pin 234. Before the sub-base 202 is mounted to the base 210, the pin 234 is in the raised position. After the sub-base 202 is mounted to the base 210 (see, e.g., FIGS. 3 and 5), the pin 234 may be depressed so that the pin 234 is in the depressed position and extends into the pin hole 236 (see, e.g., FIG. 5). This way, the attached sub-base 202 may be prevented from moving relative to the base 210. When the sub-base 202 need be changed, the pin 234 is raised from the pin hole 236, and then the base 210 and the sub-base 202 can be rotated relative to each other. It is understood a pin recess (which does not extend through the sub-base 202) may be used instead of the pinhole 236 to receive the pin 234. The pin recess may be in any shape. Those of ordinary skill in the art will understand that other securing devices may be used to prevent the sub-base 202 from moving relative to the base 210 without departing from the scope and spirit of the present invention.

[0024] FIG. 6 is an isometric view of a router table 600, wherein the quick release sub-base 202 as shown in FIGS. 3-5 may be attached to the router table 600 in accordance with an exemplary embodiment of the present invention. As shown, the router table 600 includes a work surface 602 supported on legs 604. The sub-base 202 as shown in FIGS. 3-5 is inset into the working surface 602 so as to be flush therewith. A router 300 similar to the router 200 shown in FIGS. 3-5 is secured to the underside of the table so that a bit 302 protrudes upwardly through a bit opening 304. Different from a router, with the router table, the workpiece is moved relative to the router bit, rather than vice versa. The sub-base 202 may be mounted to and removed from the router 300 as previously indicated when describing FIGS. 2-5. Thus, using the sub-base 202 in the router table 600, a router may be conveniently and quickly secured to or removed from the sub-base 202.

[0025] It is understood that the specific order or hierarchy of steps in the methods disclosed are examples of exemplary approaches. Based upon design preferences, it is understood that the specific order or hierarchy of steps in the method can be rearranged while remaining within the scope of the present invention. The accompanying method claims present elements of the various steps in a sample order, and are not meant to be limited to the specific order or hierarchy presented.

[0026] It is believed that the present invention and many of its attendant advantages will be understood by the foregoing description. It is also believed that it will be apparent that various changes may be made in the form, construction and arrangement of the components thereof without departing from the scope and spirit of the invention or without sacrificing all of its material advantages, the form herein before described being merely an explanatory embodiment thereof. It is the intention of the following claims to encompass and include such changes.